Cable Connection Replacement

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US Army Corps of Engineers

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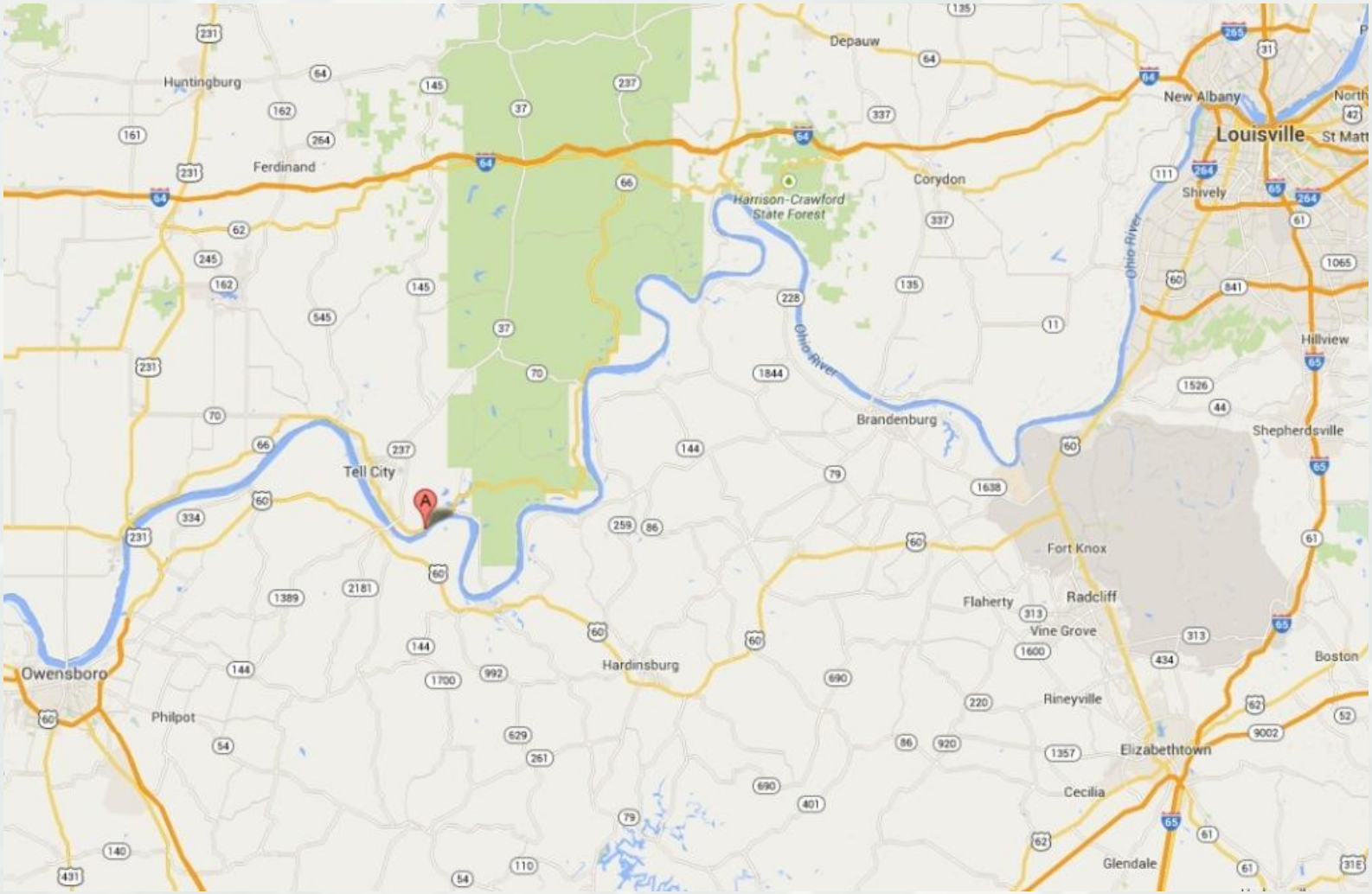
Presentation Outline

- Dam Facts
- Purpose of the repair
- Repair Process
- Lessons learned
- Questions/Comments

Location of Cannelton



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Cannelton Dam Facts

- 12 Tainter Gates
- 100 ft wide x 42 ft tall
- Gate weight 820,000 lbs
- Supported by 24 – 1 3/8” wire rope
- Operated with electric hoist machinery

Purpose: Cannelton

• 2005 inspection of Markland Cable Connections identified severe deterioration. Cannelton shares the same design.

Markland 2005

Markland 2005

Repair Process: Cannelton

- Set bulkheads and raise tainter gate to stops

- Set hydraulic tainter gate maintenance pedestals and lower gate onto pedestals

- Inspect wire rope

- Gouge wire rope above the upper connection block and remove tension bolts (for re-use)
    - Press wire rope socket from upper connection block for re-use
    - Remove keepers and upper retaining block from machinery drum
    - Using the piggy back crane hoist wire rope through the machinery room and onto the flat deck barge
    - Cut retaining block from wire rope and press out socket for re-use
    - Cut new wire rope to length

- Install upper connection block and retaining blocks on to wire rope, broom both ends, pour wire lock/socket lock and let cure

- Install new pin and connection blocks

Repair Process: Cannelton

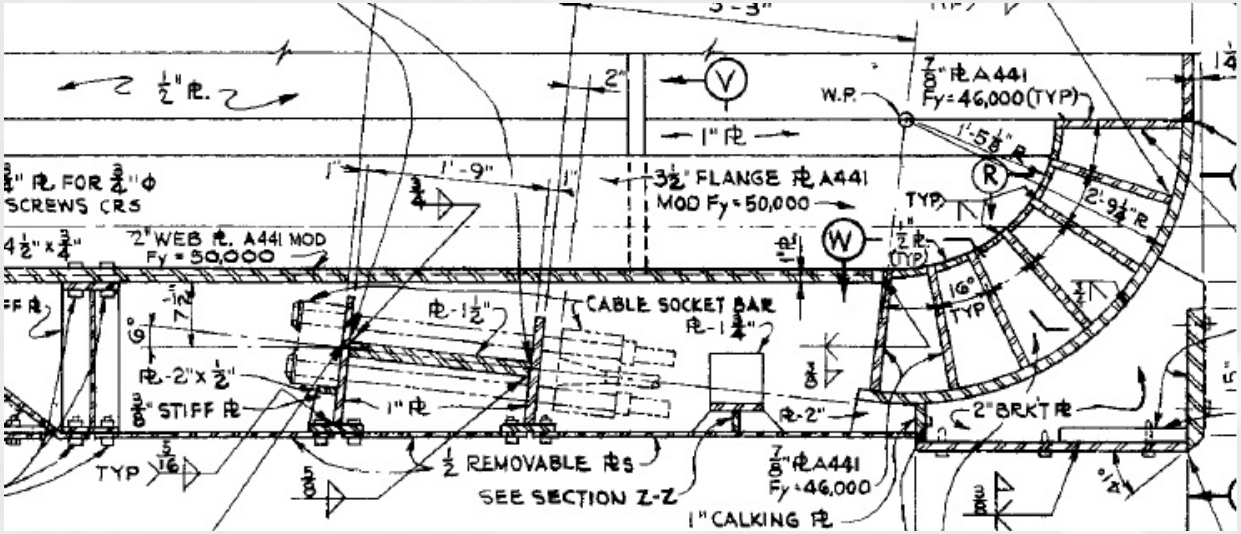
•Set bridges, take tension readings, and adjust tension

•Tilt pedestals up-stream and lower gate down to sill, raise gate take tension readings (make adjustments if needed)

•Install finger plate and knife blade plate

•Fill void with tar for sealant

•Remove pedestals



Existing Conditions

Damaged knife blade plate, and missing sealing plate

Missing knife blade plate

Existing Conditions

Damaged wire rope

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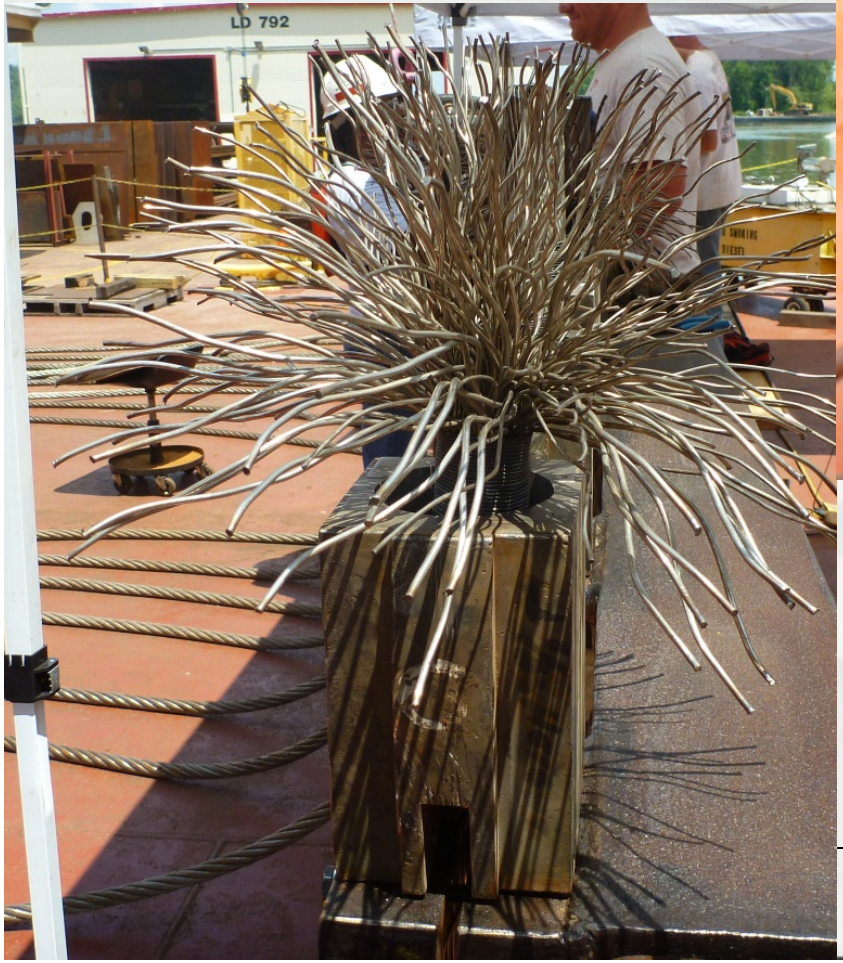
Repairs

Hydraulic maintenance pedestals

Piggy back crane hoisting wire rope through machinery room

Repairs

Broom wire rope end



Socket lock

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Repairs

Bridge for tension readings

Tilting function of
hydraulic pedestal

Finish Product

Replaced caulking plate

Replaced sealing plate and tar for sealant

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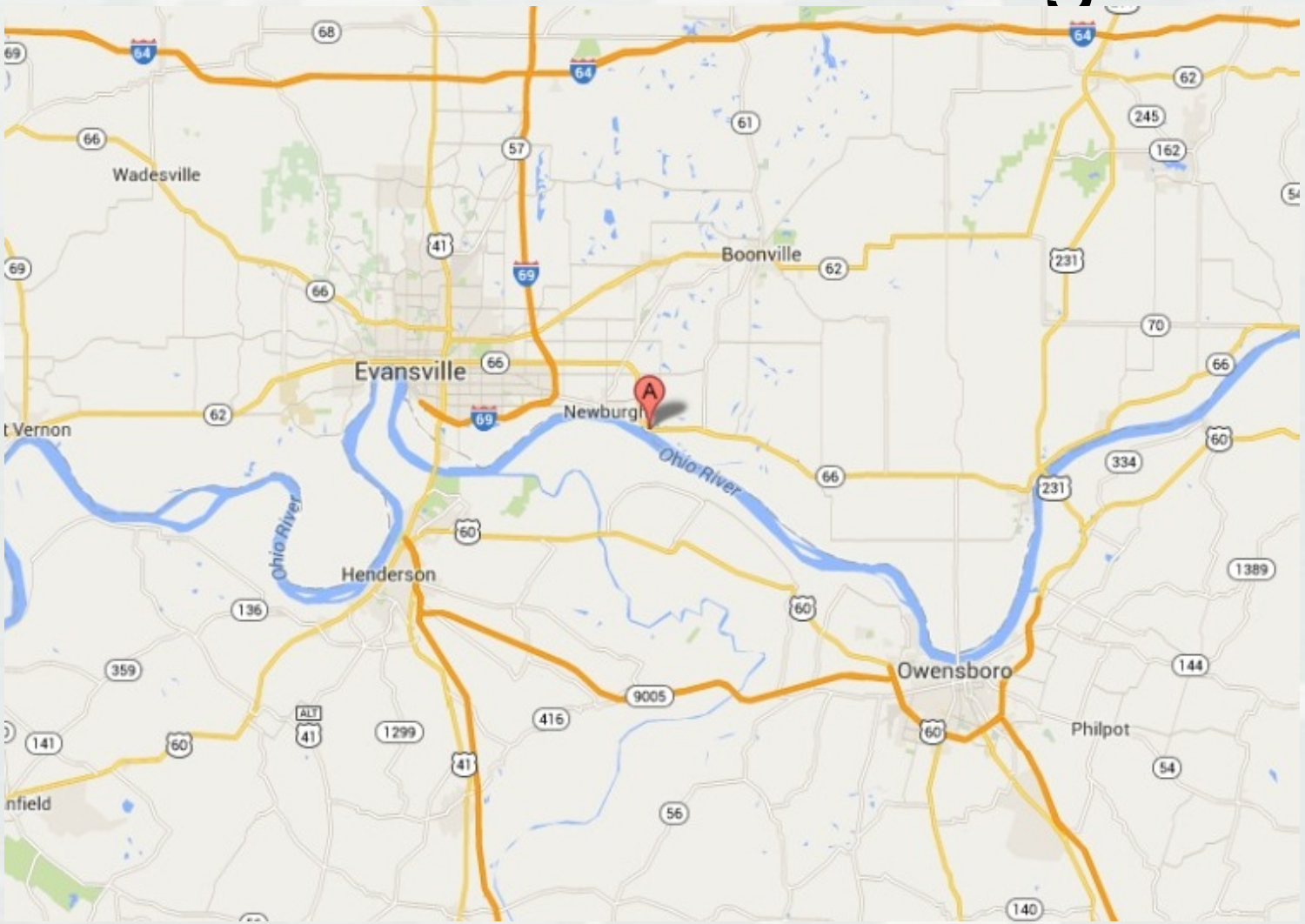
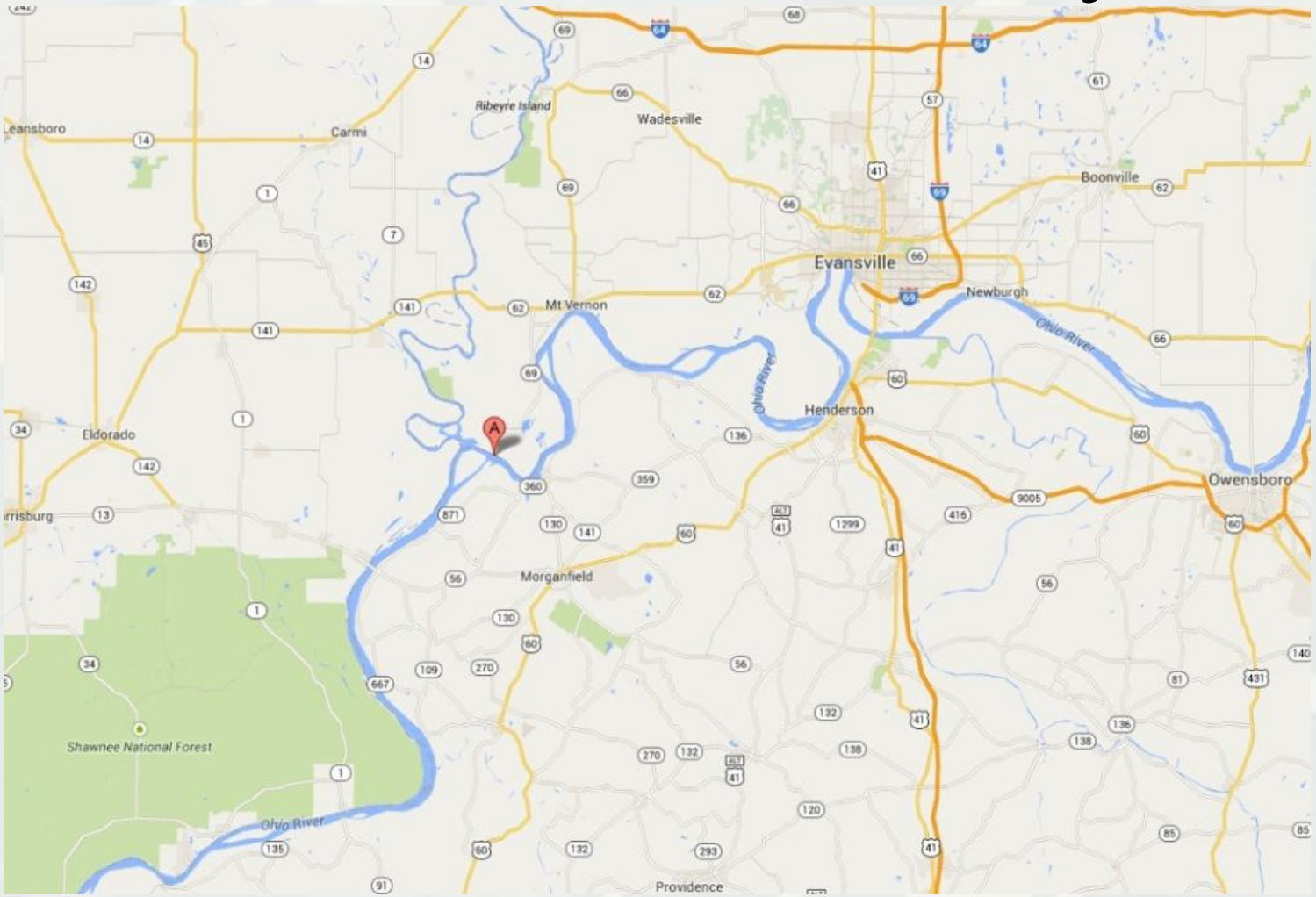
Location of Newburgh



Location of John T. Myers



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Newburgh Dam Facts

- 9 Tainter Gates
- 110 ft wide x 32 ft tall
- Gate weight 788,000 lbs
- Supported by 26 – 1 3/8” wire rope
- Operated with electric hoist machinery

John T. Myers Dam Facts

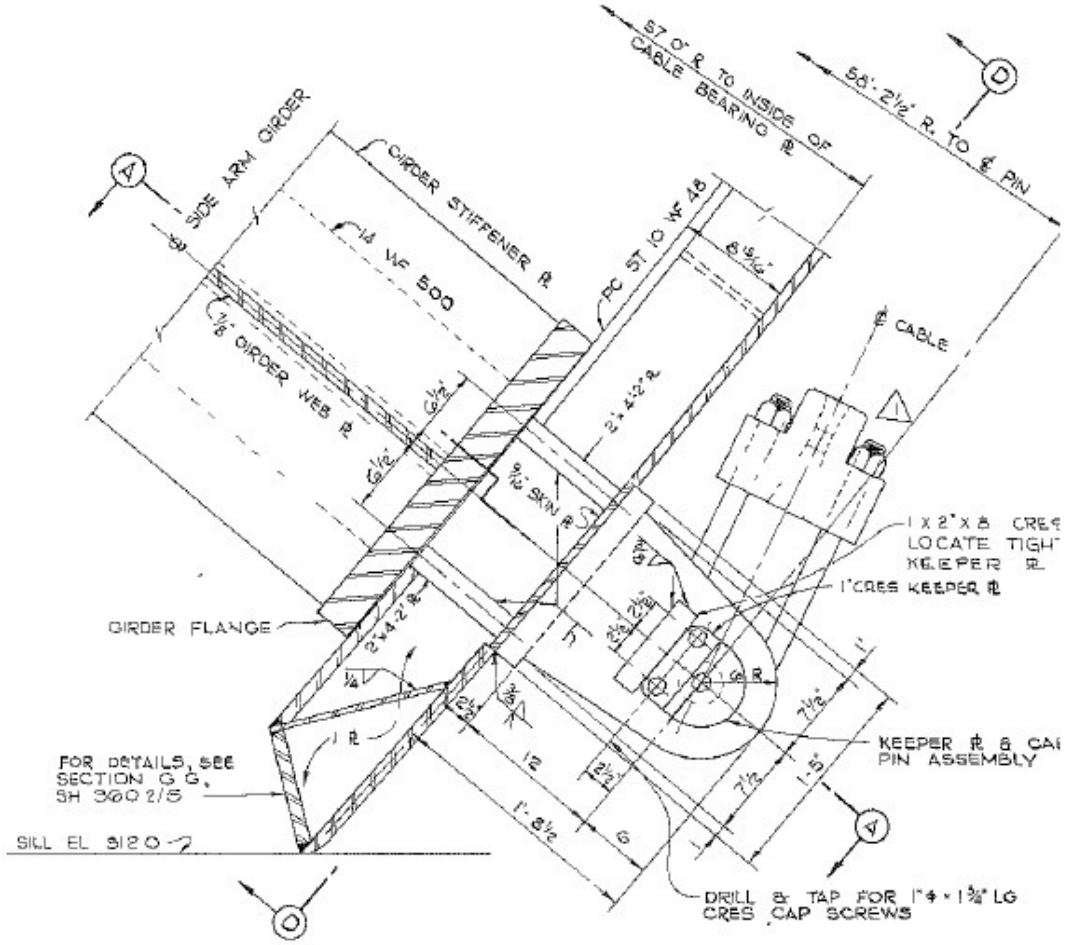
- 10 Tainter Gates
- 110 ft wide x 32 ft tall
- Gate weight 788,000 lbs
- Supported by 26 – 1 3/8” wire rope
- Operated with electric hoist machinery

Purpose: Newburgh/ John T. Myers

• OCA Rating of F, the “swivel (pivot) blocks” were seized preventing rotation and the wire rope was identified as bad at Newburgh.

John T. Myers 2014

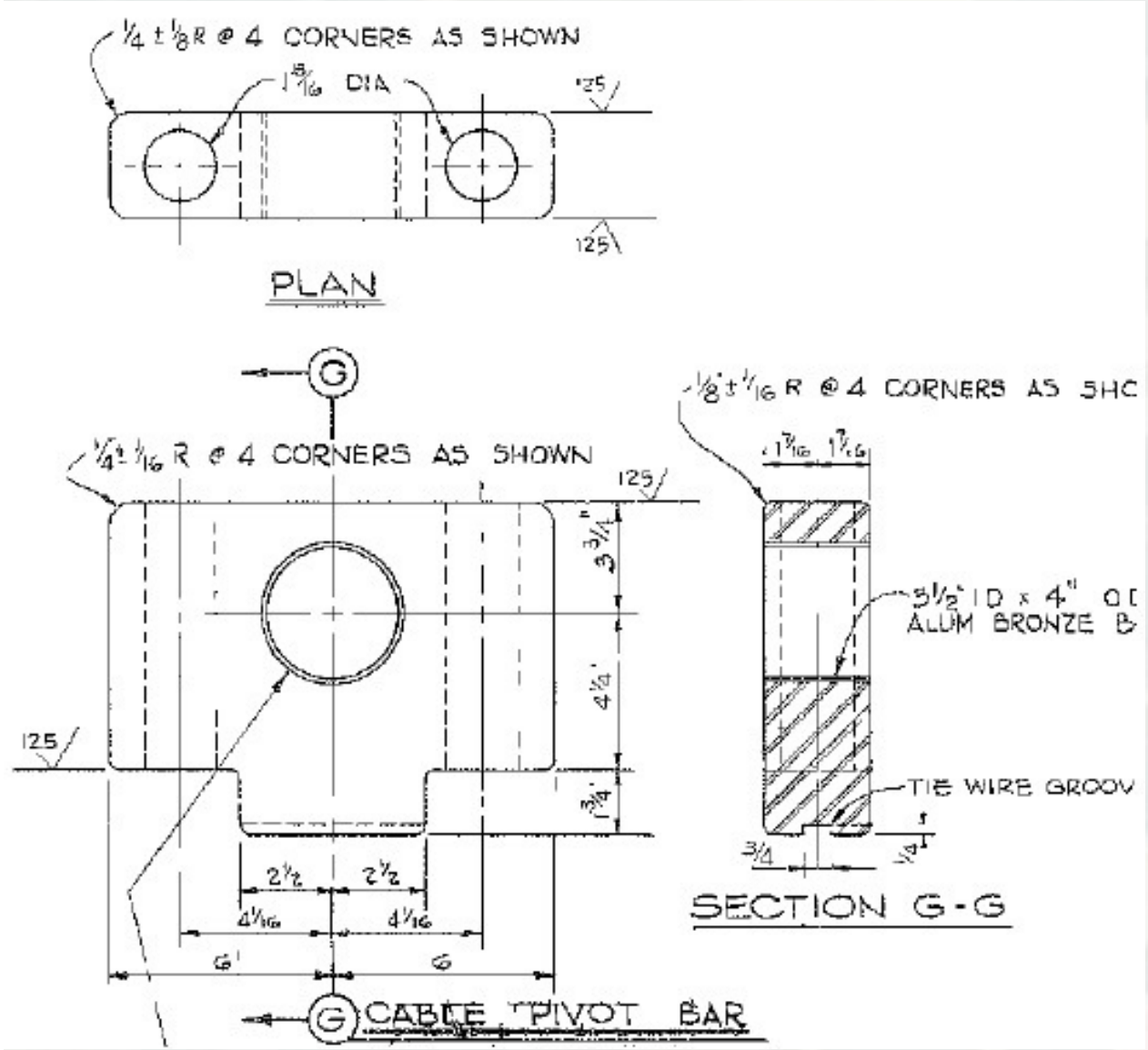
Newburgh 2014



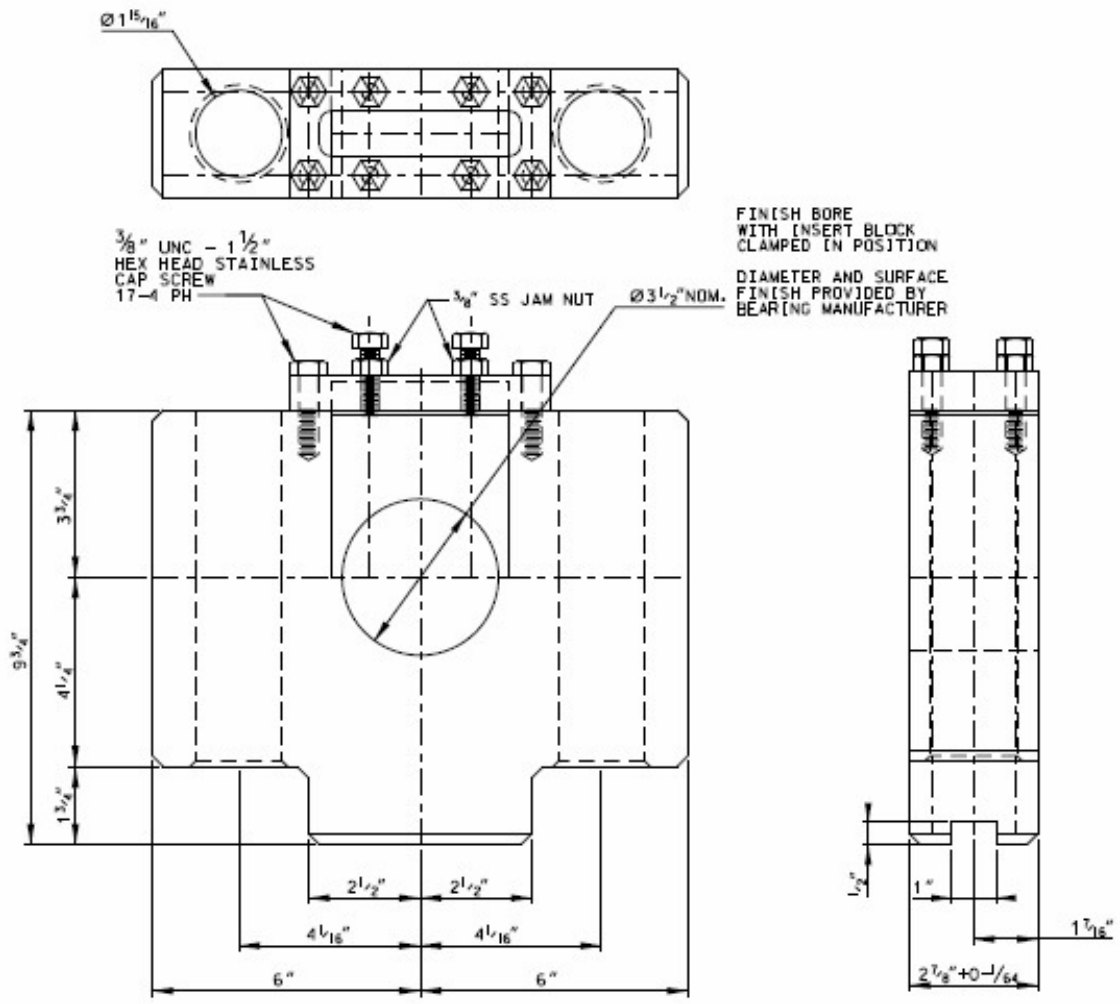
Background Information

- Work at John t. Myers was to be done by LRN through regionalization
- Work at Newburgh was to be done by LRS.
- New design of Pivot Blocks.
- Original Upper connection blocks were to be reused and wire rope inspected, either replaced or re-tensioned

Existing Pivot Block Design



Replacement Pivot Block Design



TAINTER GATE
PIVOT BLOCK ASSEMBLY

2009 Re-design by Brian Holcomb and Ross Woodbury after replacing pivot blocks on gate 10 at John T. Myers

Sliding Block Keeper
Kamatics Greaseless Bushing

Repair Process: John T. Myers

- Set bulkheads and raise tainter gate to stops
- Set tainter gate maintenance pedestals and lower gate onto pedestals
- Gouge tension bolts
- Oxy-Lance existing pivot block and pins
- Sandblast, paint cable attachment bracket, and install anodes
- Install new pin and pivot blocks
- Install new tension bolts
- Raise tainter gate, place bridges, and take tension readings
- Place tainter gate onto pedestal to make adjustments (repeat as needed)
- Install keepers
- Raise tainter gate and remove pedestal

Repairs

Lock personnel placing Bulkheads

Placement of maintenance Pedestal

Repairs

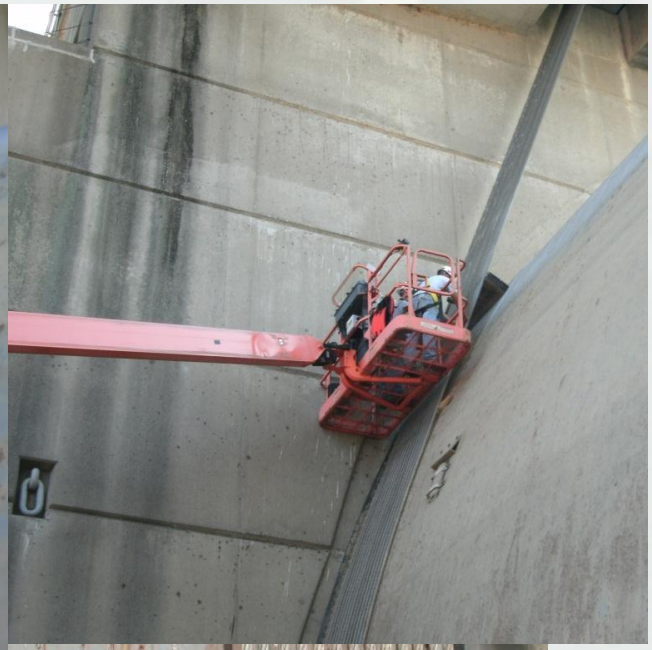
Maintenance Pedestal

Tension Bolts

Oxy-Lancing Pivot blocks

Repairs

Bridge for Tensioning



Tension Readings

Finish Product

Repair Process: Newburgh

- Set bulkheads and raise tainter gate to stops

- Set tainter gate maintenance pedestals and lower gate onto pedestals

- Gouge tension bolts and wire rope above the upper connection block
  - Press wire rope socket from upper connection block for re-use
  - Remove keepers and upper retaining block from machinery drum
  - Using the piggy back crane hoist wire rope through the machinery room and onto the flat deck barge
  - Cut retaining block from wire rope and press out socket for re-use
  - Cut new wire rope to length

- Oxy-Lance existing pivot block and pins

- Sandblast, paint cable attachment bracket, and install anodes

- Install upper connection block and retaining blocks on to wire rope, broom both ends, pour wire lock and let cure

- Install new pin and pivot blocks

Repair Process: Newburgh

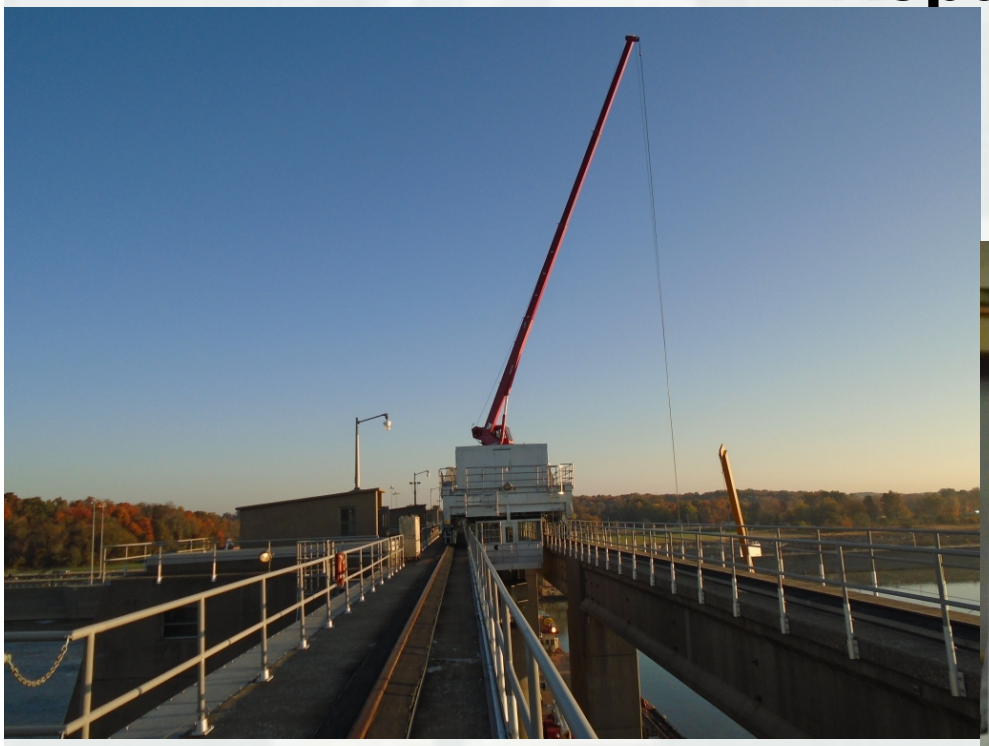
- Using piggy back crane hoist wire rope up to machinery room and install retaining block onto machinery drum with keepers
- Install new tension bolts
- Raise tainter gate, place bridges, and take tension readings
- Place tainter gate onto pedestal to make adjustments (repeat as needed)
- Install keepers
- Raise tainter gate and remove pedestal

Repairs

Placement of maintenance pedestal

Tension bolts

Repairs

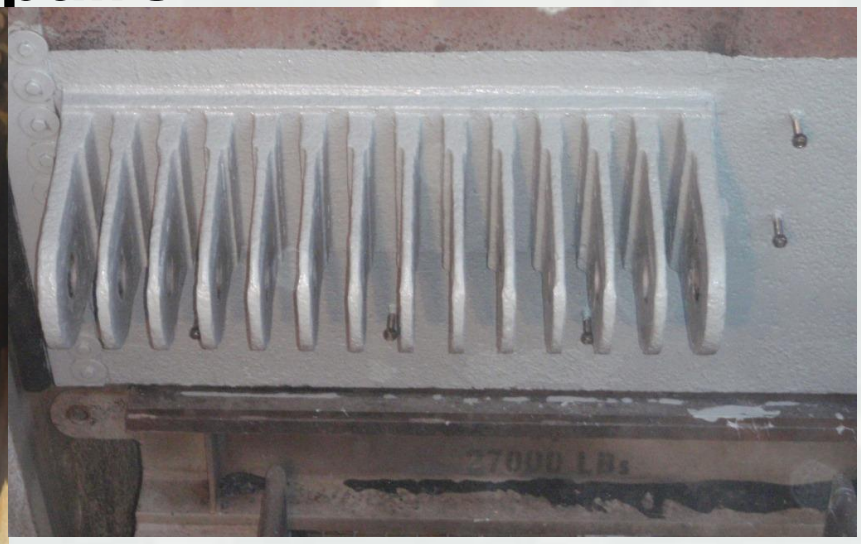


Piggy back crane hoisting old wire rope down to flat deck barge

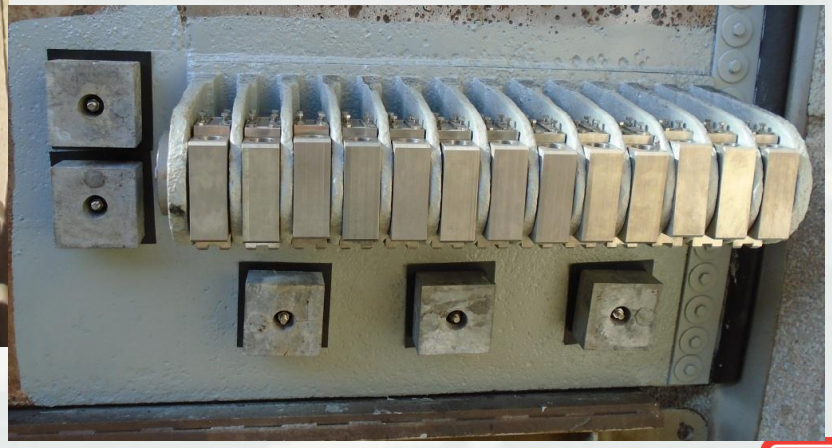
Socket pressed out of upper connection block

Repairs

Oxy-Lancing



Sandblast and Paint



New Pivot blocks and Anodes

Repairs

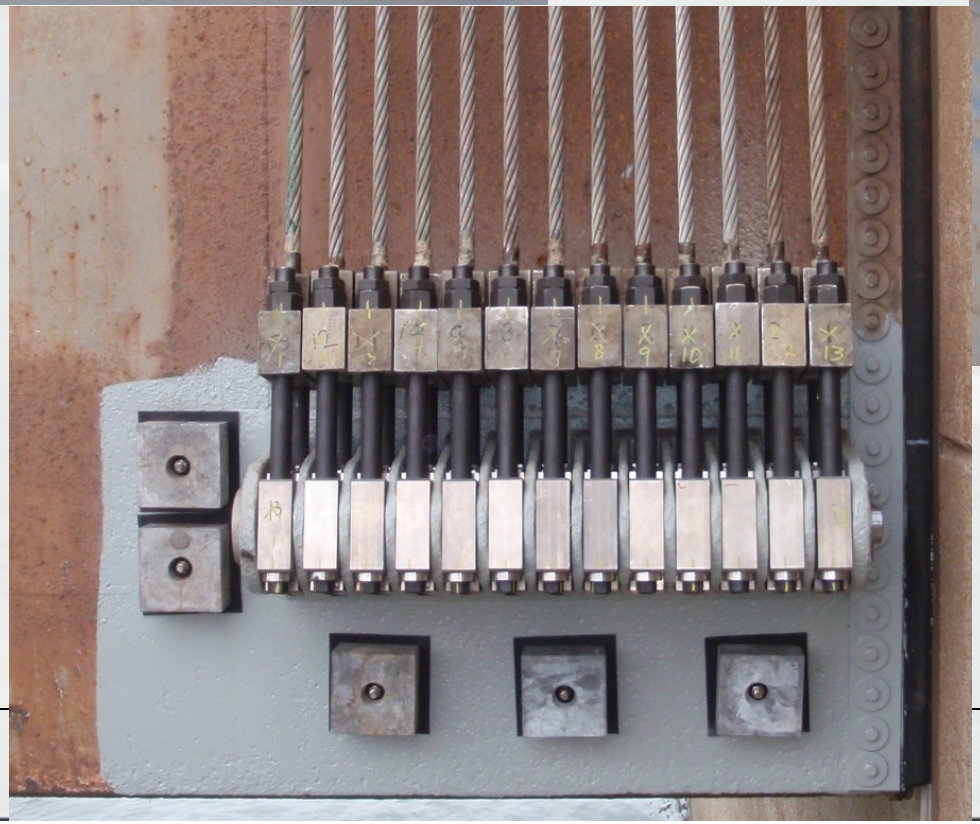
Damaged wire rope

Repairs

Broom wire rope

Socket Lock

Repairs



Bridge for tension readings

Finish product

Pivot Blocks

Before

After

Work Plan Lessons Learned

- At Newburgh the sockets had to be heated prior to pressing

- Method for bridging the wire rope for tensioning (isolating the wire rope improved tension readings)

- The use of hydraulic pedestals on tainter gates with the connections on the up-stream skin sheet do not offer any significant advantage

- Cure times for paint and wire lock had to be adjusted due to colder weather

Technical Aspects

•Properly placement of tainter gate maintenance pedestals, maximizing the bearing surface and avoiding possible debris on dam sill

•Oxy-Lancing of the pivot block, ~3” between brackets

•Cure time of wire lock/ socket lock

•Average tension within plus/minus 7% of each wire rope

•Elevation of Dam bridge and crane boom elevation during placement of pedestals

Questions / Discussions